

Anticyclones and Heavy Rainfalls over Western Iran

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Extended Abstract

Introduction

Ilam, Kermanshah and Kordestan are three provinces in Western Iran regarded as the second agriculture realm with 65 rainy days per year. It is proved that the dynamic high pressure is prevailing system over study area during warm season. It is known by the name of Azores high but we find a different situation during cold season. The tongues of Siberian high and slow-migrant ones are alternately dominant and vanished. This alternation happened in the context of westerly winds with their ridges and troughs as western waves. Western Iran is located in the front of western waves and so, precipitable systems that increase their water vapor from Black Sea at the northwestern side of Iran to Aden Gulf and even Persian Gulf at southwestern and southern sides. This potential in comparison with northern realm including Gilan, Mazandaran and Golestan Provinces with 111 rainy days, Central realm with 20 rainy days is very important for environment managers. Heavy and widespread rainfalls feed aquifers as principal sources of water for the numerous rain-fed farms in Western Iran and of course cause financial and human problems during floods. However, we can understand the temporal and spatial considerations about precipitable systems to design synoptic models in order to optimize our utilizations.

Methodology

Our study area is located over the west of Iran from 32 to 37 degrees in northern latitudes and 45 to 39 degrees in eastern longitudes. At first we set the tables of rainfall data for six weather

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stations over Western Iran to include 30 millimeters per day and more. These tables availed us to knowledge the most Heavy Rain Waves (HRW) during 1997 to 2006. Secondly, the daily weather charts of HRWs at sea and 500 HPA levels were analyzed to determine the precipitable systems including cyclones at sea level and troughs at 500 HPA level. Finally, the horizontal flux charts of specific humidity helped us to recognize principal water bodies around Iran as humidity sources for HRWs.

Results and Discussion

The study area is mountainous and includes gentle and steep slopes, deep, confined and laterally unconfined valleys and closed basins that have agriculture potential and so they are flood-prone. We selected nine weather stations that seven of them were in the area as principal ones and two of them were out of it as control stations. Heavy rainfall was defined as daily rainfall equals 30 millimeters or more that was happened at least in three weather stations during two consecutive days. There is evidence that most of pastures are overgrazed, oak forests are sparse and so, their soils have been eroded in the study area. We didn't find evidence that the mean annual precipitation of study area had increased but there is an alarming increase in the frequency of floods during the recent decades. In fact, heavy rainfalls are as the environmental consequences that are the result of interaction between the atmospheric systems and so, mountainous basins. These atmospheric hazards forming disastrous flows toward downstream areas especially in closed and wide basins. The primitive classification of data showed that Ilam City is the most hazardous point with 11 HRWs and Hamedan City in the west of study area is the least one with 2 HRWs. So, dates such as Jan. 16, 1997, Apr. 18, 2002 and Jan. 8, 1999 were the most rainy days over Western Iran. Whenever a high pressure system such as Siberian tongue or slow-migrant high was prevailed over the central part or eastern part of Iran, especially on the axis of Zagros Mountains or the eastern lands of Central Iran with northwestern-southeastern direction; the perceptible low pressures were slowly appeared and replaced toward study area. So, in these conditions HRWs were heavier and more disastrous. We found these conditions in 10 all HRWs including five events that happened over Iran, four over the Eastern and Northeastern of Iran plateau and one over Turkey. This means that perceptible lows have had enough time for water vapor reservation from water bodies including Red and Mediterranean Seas. The location of western troughs was more dispersed especially over wide and warm seas than eastern ones as interior and arid lands. It means precipitable systems have converged toward the Iran plateau and caused heavy rain falls.

Conclusion

Water bodies are locating in the west of Iran plateau from 10 to 50 degrees. The eastern part of Mediterranean Sea, middle and southern parts of Red Sea and so, Aden Gulf are two recognized water bodies that feed water vapor to precipitable systems toward Western Iran. It seems southern water bodies as warm seas can cause liquid precipitation and so more heavy rainfalls than northern seas. The formation and strengthen of humidity feeder centers on Southern Red

Sea and Aden Gulf based on the horizontal flux charts of specific humidity confirmed our results.

Keywords: *Western Iran, Heavy Rain Falls, Anticyclone.*

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